Package 'WMCapacity'

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Type Package

Title GUI implementing Bayesian working memory models

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Imports RGtk2, grDevices, XML

Description A GUI R implementation of hierarchical Bayesian models of working memory, used for analyzing change detection data.

License GPL-2

LazyLoad yes

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`WMCapacity-package` *Estimation of working memory capacity from change detection data*

Description

The WMCapacity package implements the hierarchical Bayesian multinomial models of Morey (2011), for the estimation of working memory capacity from change detection data.

Details

Package:	WMCapacity
Type:	Package
Version:	0.9
Date:	2009-06-20
License:	GPL 2
LazyLoad:	yes

Most users will want to use this package through the `wommbatGUI` function.

Author(s)

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References

Morey, R. D. (2011). A hierarchical Bayesian model for the measurement of working memory capacity. Journal of Mathematical Psychology, 55, 8-24

`VisualArray` *Working memory visual array change detection responses*

Description

This dataset contains the (cleaned) data which was analyzed in Rouder, Morey, Cowan, Zwilling, Morey, and Pratte (2008).

Usage

```
data(VisualArray)
```

Format

A data frame with 12345 observations on the following 36 variables.

`sub` the subject number

`blk` the block number

`trl` the trial number within a block

`prch` the log-odds of a change trial within that block

`N` the visual array set size

`ischange` whether the array changed or not (1=changed)

`resp` whether the participant responded "change" (1=changed)

`RT` the response time

`probesq` which square number was probed

`newcol` the color of the probed square

`c1` the color of square 1

`x1` the x location of square 1

`y1` the y location of square 1

`c2` the color of square 2

`x2` the x location of square 2

`y2` the y location of square 2

`c3` the color of square 3

`x3` the x location of square 3

`y3` the y location of square 3

`c4` the color of square 4

`x4` the x location of square 4

`y4` the y location of square 4

`c5` the color of square 5

`x5` the x location of square 5

`y5` the y location of square 5

`c6` the color of square 6

`x6` the x location of square 6

`y6` the y location of square 6

`c7` the color of square 7

`x7` the x location of square 7

`y7` the y location of square 7

`c8` the color of square 8

`x8` the x location of square 8

`y8` the y location of square 8

`cor` whether the participant was correct or not

`oldcol` the color of the probed square in the study array

Details

Each trial consisted of a presentation of N colored squares in an array, followed by a mask, and then a single square. The square was either the same color or a different color than the one in the same location in the first array. The participant responded "change" if they believed the square was different.

Source

Rouder, J. N., Morey, R. D., Cowan, N., Zwilling, C. E., Morey, C. C. & Pratte, M. S. (2008). An Assessment of Fixed-Capacity Models of Visual Working Memory. Proceedings of the National Academy of Sciences, 105, 5976-5979.

Examples

```
data(VisualArray)
## Aggregated hit and false alarm rates
tapply(VisualArray$resp,list(VisualArray$ischange,
       VisualArray$N,VisualArray$prch),mean)
```

---

womExtractModel *Extract WMCapacity model specification and results.*

Description

The womExtractModel function allows the user to extract model specification and results that were defined in the wommbatGUI graphical user interface. This allows the user to extract results for the purposes of making plots, et cetera, in R.

Usage

```
womExtractModel(name=1)
```

Arguments

name	the name (or number) of the model defined in the GUI.

Details

The womExtractModel function allows the user access to the model specifications and analysis results from the GUI, once they've been defined.

For further details, see the user's manual at http://wmcapacity.r-forge.r-project.org/.

Value

A list containing the following elements (if applicable):

modelName	The name of the model.
model	A list containing the model specification.
priors	A list containing the prior specification.
settings	A list containing the MCMC settings, if an analysis has been performed.
results	A list containing the results, if an analysis has been performed.

See Also

wommbatGUI, for fitting the working memory models.

Examples

```
    ## Not run:
    ## load Visual Array data set (Rouder et al., 2008)
    data(VisualArray)

## Define the model in the GUI
wommbatGUI(dataFrame=VisualArray)

    # extract the first model. Replace 'Model' with the model name (in quotes)
    myModel = womExtractModel(name='Model')

# examine the posterior means (if an analysis has been performed)
myModel$results$pointEst

## End(Not run)
```

---

wommbatGUI *Start GUI for working memory capacity estimation.*

Description

wommbatGUI starts the graphical user interface for building and estimating parameters of working memory models. This is the main interface for the WMCapacity package.

Usage

```
wommbatGUI(project = NULL, projectFile= NULL, CSVfile = NULL, dataFrame = NULL, devel=FALSE)
```

Arguments

dataFrame	a data frame containing the trial-by-trial data to be analyzed.
CSVfile	the location of a CSV file containing the trial-by-trial data to be analyzed.
projectFile	a saved WMCapacity analysis (.Rdata file), containing all the necessary information necessary to start an analysis.
project	a environment of a WMCapacity analysis, containing all the necessary information necessary to start an analysis.
devel	Turn on (undocumented) testing features.

Details

This function starts the GUI for estimating working memory capacity from change detection data, using the hierarchical Bayesian models described in Morey (2011).

There are a number of ways of passing data to the function. If you have the trial-by-trial data already loaded in R, you can pass the data via the dataFrame argument. If it is in a CSV file, you can load it by passing the path via the CSVfile argument. If you saved the analysis and wish to reload it, you can use the pass the saved file name to the projectFile argument. argument. Alternatively, you may load data via the GUI.

For further details, click on the Help button in the GUI, or see the user's manual at http://wmcapacity.r-forge.r-project.org/.

Value

This function returns nothing. The defined models and results may be extracted my means of the womExtractModel function.

See Also

wommbatNoGUI, for the non-GUI interface (useful for simulations).

Examples

```
## Not run:
## load Visual Array data set (Rouder et al., 2008)
data(VisualArray)

wommbatGUI(dataFrame=VisualArray)

## End(Not run)
```

wommbatNoGUI *Analyze working memory models with no GUI.*

Description

The wommbatNoGUI function analyzes the models defined in a saved wommbat analysis file, without using the GUI. This is useful for simulations.

Usage

```
wommbatNoGUI(project=NULL, projectFile= NULL, settings)
```

Arguments

settings	a list containing the MCMC settings for the analysis. See womExtractModel.
projectFile	a saved WMCapacity analysis (.Rdata file), containing all the necessary information necessary to start an analysis.
project	a environment of a WMCapacity analysis, containing all the necessary information necessary to start an analysis.

Details

This function analyzes the models specified in the saved analysis file, using no GUI.

For further details, click on the Help button in the GUI, or see the user's manual at http://wmcapacity.r-forge.r-project.org/.

Value

This function returns nothing. The defined models and results may be extracted my means of the womExtractModel function.

See Also

wommbatGUI, for the GUI interface (useful for simulations).

womRPredVals *Compute predicted values for working memory models in the package WMCapacity*

Description

The RPredVals function computes predicted response probabilities for a specified working memory model and design, given values of the effect parameters. This function is useful for model checking.

Usage

```
womRPredVals(x,setup)
```

Arguments

x	the vector containing values at which to evaluate the function.
setup	a list object, created by means of the womExtractModel function, containing the model specification.

Details

The womRPredVals function computes predicted probabilities for the model and design specified by the setup argument. The probability of responding "change" in a change detection task is predicted for each trial.

For further details, see the user's manual at http://wmcapacity.r-forge.r-project.org/.

Value

A vector of predicted probabilities; each element corresponds to a trial.

See Also

wommbatGUI, for fitting the working memory models, and womExtractModel for extracting a model specification.

Examples

```
    ## Not run:
    ## load Visual Array data set (Rouder et al., 2008)
    data(VisualArray)

    wommbatGUI(dataFrame = VisualArray)

## Once the model is defined via the GUI,
    ## compute log-likelihood at posterior mean
## replace 'Model' with model name (in quotes)
myModel = womExtractModel('Model')
```

```
 posteriorMean = myModel$results$pointEst[,5]

 womRPredVals(posteriorMean,myModel)

## End(Not run)
```

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